

CLAIMS

1. A circuit for limiting the in-rush current of a radio device coupled to a low-power external power source, comprising:
 - a switch circuit in series between said power source and said radio device, said switch having an “off” state with a high impedance and an “on” state with a low impedance; and
 - a time-delay shorting circuit coupled to said switch circuit, said time-delay shorting circuit having a time constant;
 - wherein before said time constant has elapsed, said switch circuit is in said high impedance “off” state for limiting said in-rush current to said radio device and wherein after said time constant has elapsed, said switch circuit is in said low impedance “on” state so that said radio device is powered by said external power source.
2. In the circuit of claim 1, wherein said switch circuit includes a field effect transistor having an “on” state resistance being in parallel with an in-rush current limiting resistor having a resistance, wherein said high impedance is substantially said resistance of said in-rush current limiting resistor and said low impedance is substantially said on resistance of said field effect transistor.
3. The circuit of claim 2, wherein said “on” state resistance of said field effect transistor is in the range of 0.05 to 0.2 ohms.
4. The circuit of claim 3, wherein said “on” state resistance of said field effect transistor is approximately 0.1 ohms.
5. The circuit of claim 2, wherein said resistance of said in-rush current limiting resistor is in the range of 5 to 10 ohms.

6. The circuit of claim 5, wherein said resistance of said in-rush current limiting resistor is approximately 5 ohms.
7. The circuit of claim 2, wherein said “on” state resistance of said field effect transistor is approximately 0.1 ohms and said resistance of said in-rush current limiting resistor is approximately 5 ohms.
8. The circuit of claim 1, wherein said time constant is in the range of 2 to 3 milliseconds.
9. The circuit of claim 2, wherein said time-delay circuit includes a capacitor and a resistor, said capacitor having a first end coupled to said external power supply and a second end coupled to said field effect transistor and wherein said capacitor has a capacitance and said resistor has a resistance so that said time constant is in the range of 2 to 3 milliseconds.
10. The circuit of claim 1, wherein said radio device is provided in a compact flash form factor and said low-power external power source is provided in a handheld computing device and wherein said radio device is coupled to said handheld computing device.
11. The circuit of claim 1, wherein said circuit is in said radio device.
12. The circuit of claim 1, wherein said circuit is in said power source.
13. A method for limiting the in-rush current of a radio device coupled to a low-power external power source, comprising steps of:
 - inserting a switch circuit in series between said power source and said radio device, said switch having an “off” state with a high impedance and an “on” state with a low impedance; and
 - coupling a time-delay shorting circuit to said switch circuit, said time-delay shorting circuit having a time constant;

switching to said high impedance “off” state for limiting said in-rush current to said radio device before said time constant has elapsed; and

switching to said low impedance “on” state after said time constant has elapsed so that said radio device is powered by said external power source.

14. The method of claim 13, wherein said switch circuit includes a field effect transistor having an “on” state resistance in the range of 0.05 to 0.2 ohms, said field effect transistor being in parallel with a in-rush current limiting resistor having a resistance in the range of 5 to 10 ohms, wherein said high impedance is substantially said resistance of said in-rush current limiting resistor and said low impedance is substantially said “on” state resistance of said field effect transistor.

15. The method of claim 14, wherein said “on” state resistance of said field effect transistor is approximately 0.1 ohms and said resistance of said in-rush current limiting resistor is approximately 5 ohms.

16. The method of claim 13, wherein said time constant is in the range of 2 to 3 milliseconds.

17. The method of claim 14, wherein said time-delay circuit includes a capacitor and a resistor, said capacitor having a first end coupled to said external power supply and a second end coupled to said field effect transistor and wherein said capacitor has a capacitance and said resistor has a resistance so that said time constant is in the range of 2 to 3 milliseconds.

18. The method of claim 13, wherein said radio device is provided in a compact flash form factor and said low-power external power source is provided in a handheld computing device and wherein said radio device is coupled to said handheld computing device.

19. The method of claim 13, further comprising the step of”

placing said switch circuit and said time-delay shorting circuit in said radio device.

20. The method of claim 13, further comprising the step of"

placing said switch circuit and said time-delay shorting circuit in said power supply.

21. A radio device provided in a compact flash form factor, said radio device being powered by a low-power external power source, comprising:

radio electronics having an in-rush current demand;

a switch circuit in series between said power source and said radio device, said switch circuit having an "off" state with a high impedance and an "on" state with a low impedance; and a time-delay shorting circuit coupled to said switch circuit, said time-delay shorting

circuit having a time constant;

wherein before said time constant has elapsed, said switch circuit is in said high impedance "off" state for limiting said in-rush current to said radio device and wherein after said time constant has elapsed, said switch circuit is in said low impedance "on" state so that said radio device is powered by said external power source.

22. The radio device of claim 21, wherein said switch circuit includes a field effect transistor having an "on" state resistance in the range of 0.05 to 0.2 ohms, said field effect transistor being in parallel with a in-rush current limiting resistor having a resistance in the range of 5 to 10 ohms, wherein said high impedance is substantially said resistance of said in-rush current limiting resistor and said low impedance is substantially said "on" state resistance of said field effect transistor.

23. The radio device of claim 22, wherein said "on" state resistance of said field effect transistor is approximately 0.1 ohms and said resistance of said resistor is approximately 5 ohms.

24. The radio device of claim 22, wherein said time-delay circuit includes a capacitor and a resistor, said capacitor having a first end coupled to said external power supply and a second end coupled to said field effect transistor and wherein said capacitor has a capacitance and said resistor has a resistance so that said time constant is in the range of 2 to 3 milliseconds.

25. A method for limiting the in-rush current of a radio device coupled to a low-power external power source, comprising the steps of:

initially charging the radio device with a power source in a low power state;
sensing a voltage across a component associated with said radio device; and
switching from said low power state to a full power state when said voltage exceeds a

threshold level.

26. A low power radio device, comprising:

radio electronics,

means for limiting the in-rush current of said radio electronics upon initial powering of said radio electronics.

27. The device of claim 26, wherein the means for limiting comprises a limiting resistor.

28. The device of claim 26, wherein the means for limiting comprises an RC circuit.

29. The device of claim 26, wherein the means for limiting comprises an LC circuit.

30. The device of claim 26, wherein the means for limiting comprises a voltage sensitive switch.

31. The device of claim 26, wherein the means for limiting comprises comparator.

32. The device of claim 26, wherein the means for limiting comprises a digital counter.

33. The device of claim 26, wherein the means for limiting comprises an RC circuit.

34. The device of claim 26, wherein the means for limiting comprises a current limiting diode in parallel with a field effect transistor.
35. The device of claim 26, wherein the means for limiting comprises a voltage controlled resistor.
36. The device of claim 26, wherein the means for limiting comprises a current regulator diode.
37. The device of claim 26, wherein the means for limiting comprises a PTC resettable fuse.